



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

to quote Mr. Gosse once more (p. 259), "thousands of tiny globules forming on every plant, and even all over the stones, where the infant vegetation is beginning to grow; and these globules presently rise in rapid succession to the surface all over the vessel, and this process goes on uninterruptedly as long as the rays of the sun are uninterrupted.

"Now these globules consist of *pure oxygen*, given out by the plants under the stimulus of light; and to this oxygen the animals in the tank owe their life. The difference between the profusion of oxygen-bubbles produced on a sunny day, and the paucity of those seen on a dark, cloudy day, or in a northern aspect, is very marked." Choose, therefore, a south or east window, but draw down the blind, or throw a handkerchief over all if the heat become fierce. The water should always feel cold to your hand, let the temperature be what it may.

Next, you must make up for evaporation by *fresh* water. A very little will suffice, as often as in summer you find the water in your vase sink below its original level, and prevent the water from getting too salt. For the salts, remember, do not evaporate with the water, and if you left the vase in the sun for a few weeks, it would become a mere brine-pan. — *From Kingsley's Glaucus, or the Wonders of the Shore.*

---

## A FEW SEA-WORMS.

BY A. S. PACKARD, JR.

---

OUR sea-side readers may simply shrug their shoulders in disgust at the prospect of becoming acquainted with creatures unfortunate enough to possess a few "poor relations," who have brought, either by their uncanny looks or disagreeable habits, disrepute upon the whole class of worms. We wish to put in a plea for the worm. Hear our evidence,

look at a few specimens of this much-abused race, hear the story of their life, their strange manner of increasing the annulate census, and judge, ye sea-side loiterers of the Worm's place in society. We are not levellers. A worms' a worm, a lobsters' a lobster, and a bees' a bee; and they are not convertible terms. The earth is made more beautiful by bees and the myriads of insects, for without their aid, as pollen gatherers, in fertilizing flowers and "setting" fruit, the world would be a poor sojourning place for that unsatisfied and uneasy animal who gives all other animals names. What would a fish-market be without lobsters and crabs, who, with their thousand allies, the shrimps, sea-fleas, and barnacles, are the scavengers of the sea? But with all these there is a void which worms can only fill. How could Old Neptune thrive without the Nereids, the Naidés, and the Amphitrites to adorn his halls, deftly sweep the floors of his palaces, and in a thousand ways beautify and enrich his domain by their silent, unobtrusive ministry?

An hour's search among the tidal-pools and rocks at low-water mark, will give us ample material for a few moments' discourse. We turn over a stone half-buried in the mud, and in the wealth of life there sheltered, behold strange, crawling, leech-like worms, of livid flesh-color, or dark-green or blood-red, and usually long and narrow, and with the power of indefinitely extending their bodies when in search of food or actually taking it. There are various species of Flat-worms and Nemerteans which glide rapidly over the surface. They are smooth, round or flattened, pointed at each extremity, and it is with difficulty that the head can be distinguished from the tail, as the mouth is a minute slit on the under-side of the head, and the eye-specs (almost the simplest kind of eye known) are often absent. The body is not divided into joints, or rings, while it is capable of great extension. Charles Kingsley, in his "Glaucus, or the Wonders of the Shore," has graphically described this property in a Nemertean.

"There lies an animal as foul and monstrous to the eye as 'hydra, gorgon, or chimæra dire,' and yet so wondrously fitted to its work, that we must needs endure for our own instruction to handle and to look at it. Its name I know not (though it lurks here under every stone), and should be glad to know. It seems some very 'low' Ascarid or Planarian worm. You see it? That black, shiny, knotted lump among the gravel, small enough to be taken up in a dessert-spoon. Look now, as it is raised and its coils drawn out. Three feet—six—nine, at least; with a capability of seemingly endless expansion: a slimy tape of living caoutchouc, some eighth of an inch in diameter, a dark chocolate-black, with paler longitudinal lines. Is it alive? It hangs helpless and motionless, a mere velvet string across the hand. Ask the neighboring Annelids and the fry of the rock-fishes, or put it into a vase at home, and see. It lies motionless, trailing itself among the gravel; you cannot tell where it begins or ends; it may be a dead strip of sea-weed, *Himantalia lorea* perhaps, or *Chorda filum*; or even a tarred string. So thinks the little fish who plays over and over it, till he touches at last what is too surely a head. In an instant a bell-shaped sucker mouth has fastened to his side. In another instant, from one lip, a concave double proboscis, just like a tapir's (another instance of the repetition of forms), has clasped him like a finger; and now begins the struggle: but in vain. He is being 'played' with such a fishing-line as the skill of a Wilson or a Stoddart never could invent; a living line, with elasticity beyond that of the most delicate fly-rod, which follows every lunge, shortening and lengthening, slipping and twining round every piece of gravel and stem of sea-weed, with a tiring drag such as no Highland wrist or step could ever bring to bear on salmon or on trout. The victim is tired now; and slowly, and yet dexterously, his blind assailant is feeling and shifting along his side, till he reaches one end of him; and then the black lips expand, and slowly and surely the curved finger begins

packing him end-foremost down into the gullet, where he sinks, inch by inch, till the swelling which marks his place is lost among the coils, and he is probably macerated to a pulp long before he has reached the opposite extremity of his cave of doom. Once safe down, the black murderer slowly contracts again into a knotted heap, and lies, like a boa with a stag inside him, motionless and blest."

But we will leave these lesser lights among creeping things and introduce to the reader a singular and beautiful

Fig 1.



creature (Fig. 1), which we first discovered just below low-water mark on the coast of Maine, but which has been found by some members of the Essex Institute on the piles of Beverly bridge, a rich hunting-ground for marine zoölogists. It is about an inch and a half long, rather stout in its proportions, and of a delicate pale-green mottled with a livid tint, and with irregularly scattered blackish dots and patches. When at rest, one might be readily excused if on a casual glance he should mistake the tail for the head, but when it glides slowly forwards, it protrudes a soft, somewhat irregularly conical head, which is capable of great extension, as at one moment it looks like nothing at all, and in less than another like a veritable head. Its eyes are little dark spees arranged in two  $\Lambda$  shaped lines. A little behind the eyes are given off a great profusion of long hair-like feelers, which curl around, and, when at rest, almost completely envelope its whole body. When it moves, the long pale feelers, centred with a line of delicate red, drag along after it, and perhaps aid the worm in its very slow gliding motion.

Another worm, quite interesting in its habits, is the *Hæmatorrhæa*, or Blood-drop. We found it in company with the preceding worm just below low-water mark.

While looking over the results of an hour's search among the *Laminaria* or Devil's Aprons, we noticed among the roots what was apparently a drop of blood. Placing it in a saucer, it soon moved and slowly stretched out a few feelers of unequal length, fastened the bulging ends in front of it, and thus anchored by the sucker-like swollen ends of the tentacles, drew itself along, slowly travelling around its prison. Our figure (2) represents it twice its natural size. The head and tentacles are of a paler red than the rest of the body, along each side of which is a row of short bristles, which aid it in moving in and out of its little rudely constructed tube of particles of sand, for we soon found, that, like the *Terebella*, it buried itself in the sand, leaving only the feelers exposed.

Fig. 2.

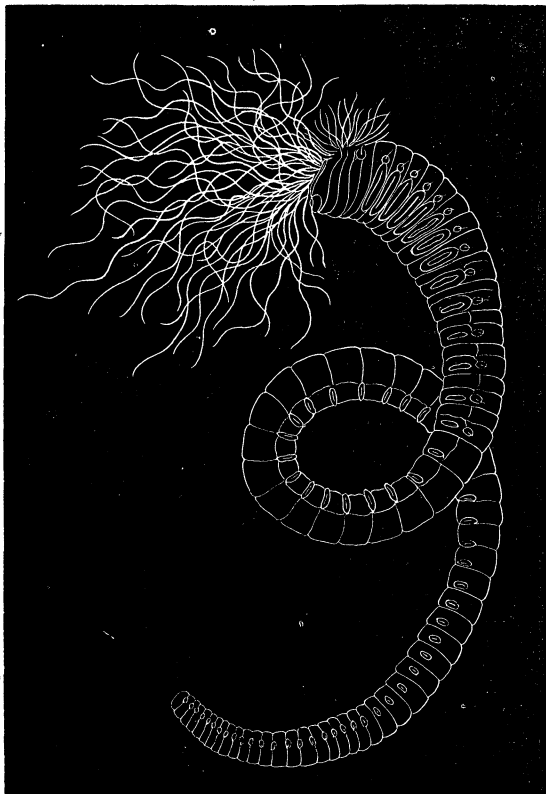


Many worms dwell in tubes, where their soft bodies are protected from prowling crabs and flesh-eating snails. Such are the *Serpulas*, which secrete a limestone shell fitting to the body, and usually curved like a ram's horn, while the tube of the *Sabella*, a beautiful worm, is leathery, or sometimes horny. An example of the latter is the case of a *Spiochætopterus* (if the reader will excuse the length of the name, no fault of the worm however), fragments of which we have dredged at a great depth, over fifty fathoms, in a deep fiord on the coast of Labrador, and which has been found on the coast of Norway by Professor M. Sars, over a foot in length and not a tenth of an inch in diameter. The *Amphitrite cirrata* (Fig. 3) is a curious tube-dweller. We have dredged it abundantly in the harbor of Eastport, Maine, that spot favored by fogs, cold storms, and icy sea-currents, where the temperature of the land and sea so nearly agree that low spring-tides reveal a wealth of life which in less-favored spots are hid far below low-water mark, and can be reached only by that uncertain means, the dredge.

Our figure, copied from Malmgren's (a Swedish naturalist) recent work on the worms of the Polar sea, relieves us from

giving a long description of this interesting worm. On being removed from its long flexible tube of mud, its thick body is seen to consist of seventy-five to eighty-five rings, with a

Fig. 3.



profusion of long tentacles, and a mass of short branchiæ, or gills, behind the head; behind which is a short row of flattened tubercles, from each of which spring a fine bristle, that aids the animal in moving in and out of its case. There is also another row of flattened tubercles along the whole length of the body. These tubercles probably enable the animal

to keep firmly within its tube, and when contracted allow it to move partially out of it.

We observed several tentacles which had been accidentally torn off, wriggling about the saucer as if actually living. Lewes (*Sea-side Studies*, p. 59) found that they retained the power of motion for six days. But should many of these feelers be cut off our *Terebella*, or *Amphitrite*, would soon be able to reproduce them, and not only this, but it has the

power, according to Lewes, of throwing off another individual like itself, by a process analogous to the budding of leaves on a plant. But let us hear Mr. Lewes himself speak :

"No one, I believe, has yet recorded the fact of the *Terebella* multiplying itself by the process of gemmation, which is known to occur in the case of some other Annelids,—such as the *Nais*, the *Syllis*, and the *Myriana*.\* When the animal reproduces by this budding process, it begins to form a second head near the extremity of its body. After this head other segments are in turn developed, the tail, or final segment, being the identical tail of the mother, but pushed forward by the young segments, and now belonging to the child, and only vicariously to the mother. In this state we have two worms and one tail. It is as if a head were suddenly to be developed out of your lumbar vertebræ, yet still remain attached to the column, and thus produce a double-headed monster, more fantastic than fable. Or suppose you were to cut a caterpillar in half, fashion a head for the tail half, and then fasten this head to the cut end of the other half,—this would give you an image of the *Syllis* budding. But in some worms the process does not stop here. What the mother did, the child does, and you may see at last six worms forming one continuous line, with only one tail for the six. The tail indeed is the family inheritance ; but reversing the laws of primogeniture, it always descends to the youngest. Such, in a few words, is the budding of annelids. I omit differences, and many curious details, only desiring to fix the reader's attention on the cardinal fact. The separation finally takes place, and then we perceive the children and grandchildren are not quite the same as their ancestor. The fact has not been observed at all hitherto in the group of annelids named *Tubicola*; yet two of my *Terebellæ* gave me a sight of it. The first died before the separation took place. The second, after a day or two's

---

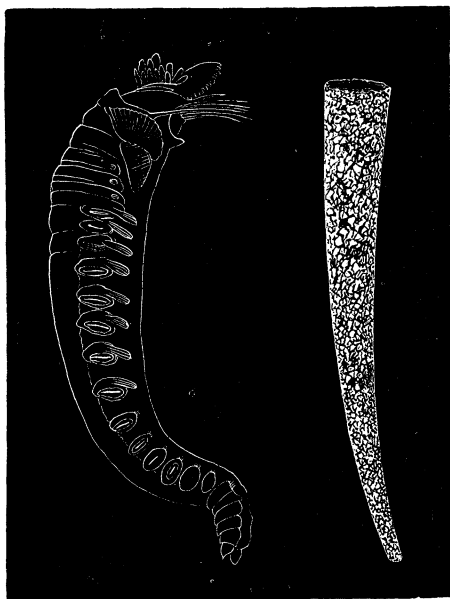
\*For an account of this mode of reproduction in worms, see Clark's "Mind in Nature," published by D. Appleton & Co., New York.



captivity, separated itself from its appendix of a baby, and seemed all the livelier for the loss of a juvenile which had been literally in that condition of 'hanging to its mother's tail,' which I have heard applied in metaphorical sarcasm to small boys anxious to be with their mothers. The young one only lived four days."

Another tube-dweller is the *Pectinaria* (Fig. 4, *Pectinaria hyperborea* of Malmgren, and its slightly curved conical

Fig. 4.



tube), which is found on our coast in deep water, and its empty tube sometimes at low water. So far as we are aware it does not protrude far out of its tube, but only exhibits a few short tentacles and a pair of the most brilliant comb-like set of golden bristles, from twelve to fourteen in each set. It is from one to two inches long, and its slightly curved tube is made up of little particles of sand so arranged as to present

a smooth, almost shining, surface both within and without. We have dredged this species most abundantly in deep, quiet, muddy bays, where it feeds on fish-offal thrown from the fishing vessels. It grows of a smaller size southward, and is scarcely as common on our shores as in the arctic seas.

But the most brilliant and gorgeous sea-worms are the Nereids. Dig down a few inches into the mud between tide-mark and you will speedily turn up the *Nereis denticulata* of

Stimpson, a common worm on our shores. In this worm the head is larger and more distinctly separated from the rest of the body than in the others we have mentioned, and it is provided with two pairs of eyes and six or eight pairs of tentacles, while along each side of the body is a row of oar-like feet, expanding above into broad, oar-like, swimming organs, and furnished beneath with several bristles and fleshy filaments like feelers. The whole worm is radiant with all the colors of the rainbow reflected from its pearly body.

Some of these Nereids are of enormous size. We have found in the Bay of Fundy portions of the *Nereis grandis* of Stimpson, which is seventeen inches in length, and an allied form (*Eunice gigantea* Cuvier) grows in the Indian Ocean to a length of over four feet. These are the princes among worms, ranking above the smaller forms by their superior size and organization, and their rich imperial dress.

---

## REVIEWS.

---

GOOD BOOKS FOR THE SEA-SIDE. — We cannot better close our sea-side number of the *NATURALIST* than by enumerating a few books on the common objects of the sea-side. We regret that more has not been done for the amateur sea-side naturalist by American writers. The shells of the shores of New England have been described by the late Dr. Gould in his *Invertebrates of Massachusetts*, originally published by the State, of which there is a new edition in preparation, to be illustrated with an abundance of first-class wood engravings, and several lithographic plates. It is to be hoped that the Legislature will see fit to order a large edition to be printed, as we learn the work is not to be stereotyped, and is not to be placed on sale, public libraries only being supplied. Otherwise, the book will not fall into the hands of naturalists, the future generations of which will be numbered by thousands, where they can now be counted by the hundred. The publication of Harris's *Injurious Insects*, which was stereotyped and is now rapidly selling, several editions having been struck off, was of incalculable advantage to the State from an educational point of view, and the stereotyping of the new edition of Gould's *Invertebrates* is a public necessity. If each legislator is to have a copy